EXHIBIT 2

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/872,996	08/31/2010	Marcel C. Rosu	YOR920090081US1	4472

48813 7590 07/06/2012

LAW OFFICE OF IDO TUCHMAN (YOR)
82-70 Beverly Road
Kew Gardens, NY 11415

EXAMINER	
PLOTKIN, JASON R	
ART UNIT	PAPER NUMBER
4163	

NOTIFICATION DATE	DELIVERY MODE
07/06/2012	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pair@tuchmanlaw.com

Office Action Summary	Application No.	Applicant(s)	
	12/872,996	ROSU, MARCEL C.	
	Examiner	Art Unit	
	JASON PLOTKIN	4163	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/31/2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-25* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-25* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *8/31/2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 5/20/2012 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

2. Claim 14 is objected to because of the following informalities: the claim recites "comprisingconfiguring" which should be "comprising, configuring"; the claim recites "mediatorto" which should be "mediator to". Appropriate correction is required.

3. Claim 16 is objected to because of the following informalities: the claim recites "mediumto" which should be "medium to". Appropriate correction is required.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1- 3, 7, 9- 15 and 22- 25 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. A piece of software "configured to execute" on a processor is not statutory subject matter. Software must be embodied on a non-transitory storage medium.

6. Claims 16- 21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. A computer program product that just exists as software is not statutory subject matter when not embodied on a non-transitory storage medium.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claim 1- 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Oshins (US Patent No. 8,151,032) hereinafter Oshins.

For claim 1, Oshins teaches:

A system comprising:

(1) An operating system kernel configure to execute on a computer processor (Column 3, line 1- 3 guest operating system running on a computer processor),

(2) A mediator configure to execute on the computer processor (Column 3, line 11- 13 a hypervisor is a synonym for a mediator),

(3) [A mediator] to operate between the operating system kernel and a data processing application (Column 3, line 8- 11 defines a workload as an application executed on a guest OS or an entire guest OS; column 3, line 19-23 the hypervisor provides a level of indirection. By controlling what area of the memory the guest OS and the application are assigned to the hypervisor operates between the guest OS and the application),

(4) The mediator to control access of user-related application state of the data processing application (Column 3, line 12- 17; the user related application state is defined as the data produced by the data processing application during its operation and which is visible to the mediator and is not visible to the operating system kernel),

(5) [The mediator] to restrict access of the operating system kernel to the user-related application state (Column 3, line 8- 11 defines a workload as an application executed on a guest OS or an entire guest OS; column 3, line 19- 23

because the hypervisor assigns memory and controls reading and writing to memory it can restrict what the OS kernel has access to).

For claim 2, Oshins teaches:

A system wherein:

(1) The user related application state comprises data produced by the data processing application during its operation (Column 12, line 8- 18 describes an application that stores the data it produces in memory),

(2) [The data] is visible to the mediator and not visible to the operating system kernel (Column 7, line 48-60, Fig. 2 The hypervisor can gain access to the data freely because it controls the DMA filter. The DMA filter intercepts every request from the guest OS to access the memory, therefore the hypervisor limits what memory the guest OS has access to. Thus data stored in memory can be visible to the hypervisor but not the guest OS).

For claim 3, Oshins teaches:

A system wherein the operating system kernel controls system- related application state that is used to control portions of the data processing application at the operating system kernel's level (Column 7, line 39- 47).

For claim 4, Oshins teaches:

A system wherein:

(1) The operating system has been modified to remove a portion of its functionality to the mediator (Column 4, line 46- 53),

(2) Data processing resources in communication with the computer processor (Column 3, line 11- 13 the hypervisor controls the data processing resources/ physical memory and the hypervisor is in communication with the processor therefore the data processing resources are in communication with the processor).

For claim 5, Oshins teaches:

A system wherein the mediator has higher access rights than the operating system kernel to the computer processor and the data processing resources (Column 4, line 14- 18 the mediator/hypervisor intercepts all calls between the guest OS and the processor and memory effectively giving it higher access rights).

For claim 6, Oshins teaches:

A system wherein the operating system kernel has restricted access to user- related application state because the mediator preforms transfers between the user- related application state and data structures of the operating system kernel as needed to enable the operating system kernel's remaining functions (Column 7, lines 9- 18;).

For claim 7, Oshins teaches:

A system wherein the mediator is configured to control system calls and exceptions between the operating system kernel and the data processing application (Column 4, line 46- 53 the mediator/ hypervisor controls all system calls; Column 8, line 66- column 9, line 12 mediator/ hypervisor handles errors when assigning memory).

9. Claims 10- 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Oshins.

Claim 10 is rejected as being analogous to claim 1.

Claim 11 is rejected as being analogous to claim 2.

Claim 12 is rejected as being analogous to claim 3.

Claim 13 is rejected as being analogous to claim 5.

Claim 14 is rejected as being analogous to claim 7.

10. Claims 16- 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Oshins.

Claim 16 is rejected as being analogous to claim 1.

Claim 17 is rejected as being analogous to claim 2.

Claim 18 is rejected as being analogous to claim 3.

Claim 19 is rejected as being analogous to claim 5.

Claim 20 is rejected as being analogous to claim 7

11. Claims 22- 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Oshins.

For claim 22:

i. A system comprising an operating system kernel configured to execute on a computer processor, a data processing application and a mediator configured to execute on the computer processor and operating between the operating system kernel and the data processing application, the mediator configured to control access of user related application state of the data processing application and restricting access of the operating system kernel to the user related application state (rejected as being analogous to claim 1).

ii. The user- related application state data comprises data produced by the data processing application during its operation and which is visible to the mediator and not visible to the operating system kernel (rejected as being analogous to claim 2).

iii. The mediator having higher access rights than the operating system kernel to the computer processor (rejected as being analogous to claim 5).

Claim 23 is rejected as being analogous to claim 3.

Claim 24 is rejected as being analogous to claim 6.

Claim 25 is rejected as being analogous to claim 7.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oshins as applied to claim 7 above, and further in view of Arndt et al. (US Publication No. 2006/0179177).

Oshins discloses a computer processor in communication with the following data processing resources:

i. Computer memory including:

(1) A mediator configured to (Column 3, line 3- 6):

(a) Use a memory management unit (MMU) to control access rights to memory (Column 5, line 58- 61, the memory management component in the guest OS has the same functionality as a MMU),

(2) Operating system kernel (Column 3, line 1-3),

(3) A shared user- level library (Column 6, line 46-49, a shared library is a file intended to be shared by executable files and loaded into memory at run time as opposed to copied by a linker when it creates a single executable file),

ii. Communication network (Column 4, line 16),

iii. Input/output (I/O) devices (Column 4, line 16),

iv. Data processing devices (Column 4, line 12- 21).

Oshins does not disclose computer memory including:

i. System daemon,

ii. A mediator configured to:

(1) Virtualize select registers of i/o devices,

(2) Use an I/O memory management unit (I/OMMU) to control data transfers between I/O devices.

Arndt discloses computer memory including:

i. System daemon (Paragraph 6, line 1- 4, a service that operates in the background not under the direct control of the user is a daemon),

ii. A mediator configured to (Paragraph 52, line 2- 5):

(1) Virtualize select registers of I/O devices (Paragraph 37, line 1- 6),

(2) Use an I/OMMU to control data transfers between I/O devices (Paragraph 32, line 4- 9; Wikipedia, IOMMU introduction page 1, a TCE table is a synonym for an I/OMMU).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the hypervisor of Oshins with the teachings of Arndt of a system daemon and a mediator configured to virtualize select registers of I/O devices and use an I/OMMU to control data transfers between I/O devices in order to reduce data transfer times between I/O devices and a guest OS running on a hypervisor.

15. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oshins as applied to claim 1 above, and further in view of Bakke et al. (US Publication No. 2007/0011272) hereinafter Bakke.

Oshins does not disclose:

a. An internet protocol security module (IPSM),

i. The IPSM exists outside the OS kernel,

ii. The IPSM is a system daemon,

iii. The IPSM directly communicates with the data processing application,

(1) Without the OS kernel.

Bakke discloses:

a. An IPSM (Paragraph 83, line 6- 10),

i. The IPSM exists outside the OS kernel (Paragraph 62, line 2- 4),

ii. The IPSM is a system daemon (Paragraph 62, line 1-10, a service that operates in the background not under the direct control of the user is a daemon),

iii. The IPSM directly communicates with the data processing application (Paragraph 62, line 10- 13),

(1) Without the OS kernel (Paragraph 62, line 10- 13).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the hypervisor of Oshins with the teachings of Bakke in order to reduce the time it takes for an application in a guest OS to transmit or receive data from the internet while increasing the security of the connection.

16. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oshins as applied to claim 1 above, and further in view of Bakke.

Claim 15 is rejected as being analogous to claim 9.

17. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oshins as applied to claim 1 above, and further in view of Bakke.

Claim 21 is rejected as being analogous to claim 9.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The reference Rosu et al. (US Publication No. 2008/0263554) discloses a method and apparatus for improving I/O requests. The reference Rosu et al. (US Publication No. 2008/0184229) discloses a method and apparatus for migrating virtual machines between physical servers. The reference Lee et al. (US Publication No. 2010) discloses a method and an apparatus for a processor and a hypervisor to create a secure area to execute software. The reference Njoku et al. (US Patent No. 7,606,965) discloses a method of using virtualized switches and ports to communicate with I/O devices through a hypervisor.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Plotkin whose telephone number is 571-270-7892. The examiner can normally be reached on M-F 8 A.M. -5 P.M. (alternate Fridays).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Farid Homayounmehr can be reached on 571-272-3739. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. P./
Examiner, Art Unit 4163

/Farid Homayounmehr/

Supervisory Patent Examiner, Art Unit 2495

REMARKS

The Applicants thank the Examiner for the careful review of the present application. In the Office Action dated July 6, 2012, claims 14 and 16 were objected to, claims 1-3, 7, 9-21 and 22-25 were rejected under 35 U.S.C. § 101, claims 1-7, 10-14, 16-20, and 22-25 were rejected under 35 U.S.C. § 102, and claims 8, 9, 15 and 21 were rejected under 35 U.S.C. § 103.

By this Amendment, claims 1, 10, 14, 16 and 22 are amended. Claims 1-25 remain in this application, with claims 1, 10, 16 and 22 being independent claims.

I. CLAIM OBJECTIONS

Claims 14 and 16 were objected due to typographical errors. By this Amendment, the errors are corrected. The Applicants thank the Examiner for pointing out these errors.

II. REJECTIONS UNDER 35 U.S.C. § 101

Claims 1-3, 7, 9-21 and 22-25 were rejected under 35 U.S.C. § 101 as directed to non-statutory subject matter.

35 U.S.C. § 101 promulgates, "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." 35 U.S.C. §101. The U.S. Supreme Court recently determined that, "the machine-or-transformation test is a useful and important clue, an investigative tool, for determining

whether some claimed inventions are processes under § 101." Bilski v. Kappos, 130 S. Ct. 3218, 3227 (2010).

By this Amendment, claim 1 includes recitation of a computer processor. Thus, the claim ties the claimed subject matter to a particular machine. Independent claims 10 and 22 are similarly amended to recite a computer processor. As such, independent claims 1, 10 and 22 are directed to non-statutory subject matter. Their respective dependent claims, which incorporate all the independent claim limitations, are also tied to a particular machine and are directed to statutory subject matter.

Furthermore, "A claim drawn to such a computer readable medium that covers both transitory and non-transitory embodiments may be amended to narrow the claim to cover only statutory embodiments to avoid a rejection under 35 U.S.C. § 101 by adding the limitation 'non-transitory' to the claim. Such an amendment would typically not raise the issue of new matter, even when the specification is silent because the broadest reasonable interpretation relies on the ordinary and customary meaning that includes signals per se." Subject Matter Eligibility of Computer Readable Media, notice on 1/26/10 (internal citation omitted).

Claim 16, as currently amended, includes the limitation of "a non-transitory computer readable storage medium." Thus, claim 16 is directed to statutory subject matter because it is not directed toward a propagating signal. Furthermore, as used herein, "a non-transitory computer readable storage medium" includes all computer readable storage medium, with the sole

exception being a transitory, propagating signal. As claims 17-21 depend from claim 16 and include all of its limitations, claims 17-22 are also directed to statutory subject matter.

III. CLAIMS 1-7, 10-14, 16-20, AND 22-25 ARE PATENTABLE OVER OSHINS

The Office Action rejects claims 1-7, 10-14, 16-20, and 22-25 as allegedly anticipated by U.S. Patent No. 8,151,032 ("Oshins"). OA, pp. 3-6.

It is well established law that for anticipation under 35 U.S.C. §102, the reference "must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present." MPEP § 706.02. Further, "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." In re Verdegaal Bros. v. Union Oil Co. of California, 2USPQ2d 1051, 1053 (Fed. Cir. 1987).

Claim 1 is amended herein to recite, "a non-virtualized operating system kernel configured to execute on the computer processor." Support for this amendment is found at least at paragraph [0048] and Figure 1 of the present application.

The Applicants respectfully submit that claim 1 is not anticipated by Oshins. Oshins relates to techniques to increase runtime performance of a guest operating system (virtualized operating system) executing on a hypervisor by allowing the guest operating system direct access to physical hardware devices to perform Direct Memory Access (DMA) transfers, while

allowing the system memory allocated to the guest operating system to be overcommitted. Oshins, col. 1, lines 44-49.

By contrast, claim 1 requires a mediator to control access of user-related application state of the data processing application and to restrict access of the non-virtualized operating system kernel to the user-related application state. Oshins does not contemplate such a mediator.

More particularly, the hypervisor disclosed in Oshins creates a virtual machine executing a virtualized operating system. Oshins, col. 3, lines 6-8. Thus, the hypervisor of Oshins has no capacity to restrict access of the non-virtualized operating system kernel to the user-related application state.

Thus, for at least the foregoing reasons, Oshins cannot anticipate claim 1. Independent claims 10, 16 and 22 recite elements similar to claim 1. Thus, claims 1 10, 16 and 22 are allowable over Oshins. Their dependent claims, which recite yet further distinguishing features, and are also patentable over Oshins and require no further discussion herein.

CONCLUSION

In view of the forgoing remarks, it is respectfully submitted that this case is now in condition for allowance and such action is respectfully requested. If any points remain at issue that the Examiner feels could best be resolved by a telephone interview, the Examiner is urged to contact the attorney below.

No fee is believed due with this Amendment, however, should

a fee be required please charge Deposit Account 50-0510. Should any extensions of time be required, please consider this a petition thereof and charge Deposit Account 50-0510 the required fee.

Respectfully submitted,

Dated: October 7, 2012

/ido tuchman/

Ido Tuchman, Reg. No. 45,924
Law Office of Ido Tuchman
82-70 Beverly Road
Kew Gardens, NY 11415
Telephone (718) 544-1110
Facsimile (718) 374-6092

Notice of References Cited	Application/Control No. 12/872,996	Applicant(s)/Patent Under Reexamination ROSU, MARCEL C.	
	Examiner Jason Plotkin	Art Unit 2492	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2011/0265164	10-2011	LUCOVSKY et al.	726/7
*	B	US-7,519,814	04-2009	Rochette et al.	713/167
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	VirtualBox, VirtualBox Manual, Http://www.virtualbox.org/manual/ch10.html (last visited Nov. 15, 2012).
	V	Gaurav Somani & Sanjay Chaudhary, Application Performance Isolation in Virtualization, Cloud Computing, 2009, 41-8, Sept. 21-25, 2009.
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Office Action Summary	Application No.	Applicant(s)	
	12/872,996	ROSU, MARCEL C.	
	Examiner	Art Unit	
	Jason Plotkin	2492	

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Status

1)☒ Responsive to communication(s) filed on *10/7/2012*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-25* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-25* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *31 August 2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *20121109* .

4) ☐ Other: _____.

DETAILED ACTION

1. This final action is responsive to applicant's amendment filed on 10/7/2012. Claims 1- 25 are pending. Claims 1- 25 are amended. Claims 1- 25 represent a mediator that prevents malware by restricting access to the memory.

Claim Objections

2. All objections to the claims have been corrected by applicant's amendment and all of examiner's objections have been withdrawn.

Claim Rejections - 35 USC § 101

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. All of examiner's rejections with respect to 35 USC § 101 have been corrected by applicant's amendments and are withdrawn.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. **Claims 1- 7, 10- 14, 16- 20 and 22- 25** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins (US Patent No. 8,151,032)**, hereinafter Oshins, and further in view of **VirtualBox**.

For **claim 1**, Oshins teaches:

A system comprising:

(1) A processor (Column 3, line 1- 3 guest operating system running on a computer processor),

(2) A mediator configure to execute on the computer processor (Column 3, line 11- 13 a hypervisor is a synonym for a mediator),

(3) [A mediator] to operate between the operating system kernel and a data processing application (Column 3, line 8- 11 defines a workload as an application executed on a guest OS or an entire guest OS; column 3, line 19-23 the hypervisor provides a level of indirection. By controlling what area of the memory the guest OS and the application are assigned to the hypervisor operates between the guest OS and the application),

(4) The mediator to control access of user-related application state of the data processing application (Column 3, line 12- 17; the user related application state is defined as the data produced by the data processing application during its operation and which is visible to the mediator and is not visible to the operating system kernel),

(5) [The mediator] to restrict access of the operating system kernel to the user-related application state (Column 3, line 8- 11 defines a workload as an application executed on a guest OS or an entire guest OS; column 3, line 19- 23 because the hypervisor assigns memory and controls reading and writing to memory it can restrict what the OS kernel has access to).

Oshins fails to teach a non-virtualized operating system configured to execute on a computer processor.

VirtualBox teaches a non-virtualized host operating system and a software virtualization environment where a guest OS runs on a virtual machine implemented on the host OS. (VirtualBox Manual Ch. 10 §Details about Software Virtualization Paragraph 8. The hypervisor of Oshins can be implemented to operate between the host OS and the Guest OS of Virtualbox)

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins with the teaching of a hosted virtual machine of VirtualBox in order to create a more secure environment by restricting the memory access between the guest OS and the Host OS.

For **claim 2**, Oshins teaches:

A system wherein:

(1) The user related application state comprises data produced by the data processing application during its operation (Column 12, line 8- 18 describes an application that stores the data it produces in memory),

(2) [The data] is visible to the mediator and not visible to the operating system kernel (Column 7, line 48-60, Fig. 2 The hypervisor can gain access to the data freely because it controls the DMA filter. The DMA filter intercepts every request from the guest OS to access the memory, therefore the hypervisor limits what memory the guest OS has access to. Thus data stored in memory can be visible to the hypervisor but not the guest OS).

For **claim 3**, Oshins teaches:

A system wherein the operating system kernel controls system- related application state that is used to control portions of the data processing application at the operating system kernel's level (Column 7, line 39- 47).

For **claim 4**, Oshins teaches:

A system wherein:

(1) The operating system has been modified to remove a portion of its functionality to the mediator (Column 4, line 46- 53),

(2) Data processing resources in communication with the computer processor (Column 3, line 11- 13 the hypervisor controls the data processing resources/ physical memory and the hypervisor is in communication with the processor therefore the data processing resources are in communication with the processor).

For **claim 5**, Oshins teaches:

A system wherein the mediator has higher access rights than the operating system kernel to the computer processor and the data processing resources (Column 4, line 14- 18 the mediator/hypervisor intercepts all calls between the guest OS and the processor and memory effectively giving it higher access rights).

For **claim 6**, Oshins teaches:

A system wherein the operating system kernel has restricted access to user- related application state because the mediator preforms transfers between the user- related application state and data structures of the operating system kernel as needed to enable the operating system kernel's remaining functions (Column 7, lines 9- 18;).

For **claim 7**, Oshins teaches:

A system wherein the mediator is configured to control system calls and exceptions between the operating system kernel and the data processing application (Column 4, line 46- 53 the mediator/ hypervisor controls all system calls; Column 8, line 66- column 9, line 12 mediator/ hypervisor handles errors when assigning memory).

Claim 10 is rejected as being analogous to claim 1.

Claim 11 is rejected as being analogous to claim 2.

Claim 12 is rejected as being analogous to claim 3.

Claim 13 is rejected as being analogous to claim 5.

Claim 14 is rejected as being analogous to claim 7.

Claim 16 is rejected as being analogous to claim 1.

Claim 17 is rejected as being analogous to claim 2.

Claim 18 is rejected as being analogous to claim 3.

Claim 19 is rejected as being analogous to claim 5.

Claim 20 is rejected as being analogous to claim 7

For **claim 22** Oshins teaches:

i. A system comprising an operating system kernel configured to execute on a computer processor, a data processing application and a mediator configured to execute on the computer processor and operating between the operating system kernel and the data processing application, the mediator configured to control access of user related application state of the data processing application and restricting access of the operating system kernel to the user related application state (rejected as being analogous to claim 1).

ii. The user- related application state data comprises data produced by the data processing application during its operation and which is visible to the mediator and not visible to the operating system kernel (rejected as being analogous to claim 2).

iii. The mediator having higher access rights than the operating system kernel to the computer processor (rejected as being analogous to claim 5).

Claim 23 is rejected as being analogous to claim 3.

Claim 24 is rejected as being analogous to claim 6.

Claim 25 is rejected as being analogous to claim 7.

8. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins** further in view of **VirtualBox** as applied to claim 7 above, and further in view of **Arndt et al. (US Publication No. 2006/0179177)**, hereinafter Arndt.

Oshins discloses a computer processor in communication with the following data processing resources:

i. Computer memory including:

(1) A mediator configured to (Column 3, line 3- 6):

(a) Use a memory management unit (MMU) to control access rights to memory (Column 5, line 58- 61, the memory management component in the guest OS has the same functionality as a MMU),

(2) Operating system kernel (Column 3, line 1-3),

(3) A shared user- level library (Column 6, line 46-49, a shared library is a file intended to be shared by executable files and loaded into memory at run time as opposed to copied by a linker when it creates a single executable file),

ii. Communication network (Column 4, line 16),

iii. Input/output (I/O) devices (Column 4, line 16),

iv. Data processing devices (Column 4, line 12- 21).

Oshins does not disclose computer memory including:

i. System daemon,

ii. A mediator configured to:

(1) Virtualize select registers of i/o devices,

(2) Use an I/O memory management unit (I/OMMU) to control data transfers between I/O devices.

Arndt discloses computer memory including:

i. System daemon (Paragraph 6, line 1- 4, a service that operates in the background not under the direct control of the user is a daemon),

ii. A mediator configured to (Paragraph 52, line 2- 5):

(1) Virtualize select registers of I/O devices (Paragraph 37, line 1- 6),

(2) Use an I/OMMU to control data transfers between I/O devices (Paragraph 32, line 4- 9; Wikipedia, IOMMU introduction page 1, a TCE table is a synonym for an I/OMMU).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins and the

teaching of a hosted virtual machine of VirtualBox with the teachings of Arndt of a system daemon and a mediator configured to virtualize select registers of I/O devices and use an I/OMMU to control data transfers between I/O devices in order to reduce data transfer times between I/O devices and a guest OS running on a hypervisor.

9. **Claims 9, 15 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins** further in view of **VirtualBox** as applied to claim 1 above, and further in view of **Bakke et al. (US Publication No. 2007/0011272)**, hereinafter Bakke.

For **claim 9**, Neither Oshins nor VirtualBox disclose:

a. An internet protocol security module (IPSM),

i. The IPSM exists outside the OS kernel,

ii. The IPSM is a system daemon,

iii. The IPSM directly communicates with the data processing application,

(1) Without the OS kernel.

Bakke discloses:

a. An IPSM (Paragraph 83, line 6- 10),

i. The IPSM exists outside the OS kernel (Paragraph 62, line 2- 4),

ii. The IPSM is a system daemon (Paragraph 62, line 1-10, a service that operates in the background not under the direct control of the user is a daemon),

iii. The IPSM directly communicates with the data processing application (Paragraph 62, line 10- 13),

(1) Without the OS kernel (Paragraph 62, line 10- 13).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins and the teaching of a hosted virtual machine of VirtualBox with the teachings of Bakke in order to reduce the time it takes for an application in a guest OS to transmit or receive data from the internet while increasing the security of the connection.

Claim 15 is rejected as being analogous to claim 9.

Claim 21 is rejected as being analogous to claim 9.

Response to Arguments

10. Applicant's arguments filed 10/7/2010 have been fully considered but they are in view of the new grounds of rejection presented above.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The reference Lucovsky et al. (US Publication No 2011/0265164) discloses a cloud computing environment that compartmentalizes applications in a virtual machine. The reference Rochette et al. (US Patent 7,519,814) discloses a method of compartmentalizing applications on a server in a virtual environment. The reference Application Performance Isolation in Virtualization discloses using a virtual machine to compartmentalize applications.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Plotkin whose telephone number is (571)270-7892. The examiner can normally be reached on M-F 8 A.M. -5 P.M. (alternate Fridays).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. P./
Examiner, Art Unit 2492

/saleh najjar/
Supervisory Patent Examiner, Art Unit 2492

REMARKS

The Applicants thank the Examiner for the careful review of the present application. In the Final Office Action dated November 26, 2012, claims 14 and 16 were objected to, claims 1-3, 7, 9-21 and 22-25 were rejected under 35 U.S.C. § 101, claims 1-7, 10-14, 16-20, and 22-25 were rejected under 35 U.S.C. § 102, and claims 8, 9, 15 and 21 were rejected under 35 U.S.C. § 103.

By this Amendment, claims 1, 10, 14, 16 and 22 are amended. Claims 1-25 remain in this application, with claims 1, 10, 16 and 22 being independent claims.

III. CLAIMS 1-7, 10-14, 16-20, AND 22-25 ARE PATENTABLE OVER OSHINS

The Office Action rejects claims 1-7, 10-14, 16-20, and 22-25 are rejected under 35 U.S.C. § 103 as allegedly obvious over U.S. Patent No. 8,151,032 ("Oshins") in view of VirtualBox, VirtualBox Manual, http://www.virtualbox.org/manual/ch10.html (last visited Nov. 15, 2012) ("VirtualBox"). FOA, pp. 3-6.

According to the Supreme Court, the factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966), "continue to define the inquiry that controls" obviousness rejections under 35 U.S.C. 103. KSR Int'l v. Teleflex Inc., 550 U.S. 398, 407 (2007). Under the analysis required by Graham to support a rejection under 35 U.S.C. 103, "the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the

level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." Graham, 383 U.S. at 17-18. While these inquiries are factual, the ultimate determination of obviousness is a conclusion of law made in view of the totality of the resolved Graham factors. KSR, 550 U.S. at 427; Graham, 383 U.S. at 17.

Claim 1, as amended, recites in part, "wherein the operating system kernel is modified to remove a portion of its functionality to the mediator." Support for this amendment can be found at least at paragraph [0031] of the present application. Thus, no new matter is introduced by the amendment.

The Applicants respectfully submit that claim 1 is not obvious over Oshins in view of Virtual Box. Oshins relates to techniques to increase runtime performance of a guest operating system (virtualized operating system) executing on a hypervisor by allowing the guest operating system direct access to physical hardware devices to perform Direct Memory Access (DMA) transfers, while allowing the system memory allocated to the guest operating system to be overcommitted. Oshins, col. 1, lines 44-49. Virtual Box teaches a non-virtualized host operating system and a software virtualization environment where a guest OS runs on a virtual machine implemented on the host OS.

By contrast, claim 1 requires that the operating system kernel is modified to remove a portion of its functionality to the mediator. It is respectfully submitted that Oshins and Virtual Box, either alone or in combination, fail to disclose or reasonably suggest modifying an operating system kernel to remove a portion of its functionality to the mediator.

Thus, for at least the foregoing reason, claim 1 is not obvious over Oshins in view of Virtual Box. Independent claims 10, 16 and 22 recite elements similar to claim 1. Thus, claims 1 10, 16 and 22 are allowable over Oshins in view of Virtual Box. Their dependent claims, which recite yet further distinguishing features, and are also patentable over Oshins in view of Virtual Box and require no further discussion herein.

CONCLUSION

In view of the forgoing remarks, it is respectfully submitted that this case is now in condition for allowance and such action is respectfully requested. If any points remain at issue that the Examiner feels could best be resolved by a telephone interview, the Examiner is urged to contact the attorney below.

No fee is believed due with this Amendment, however, should a fee be required please charge Deposit Account 50-0510. Should any extensions of time be required, please consider this a petition thereof and charge Deposit Account 50-0510 the required fee.

Respectfully submitted,

Dated: February 26, 2013

/ido tuchman/

Ido Tuchman, Reg. No. 45,924
Law Office of Ido Tuchman
82-70 Beverly Road
Kew Gardens, NY 11415
Telephone (718) 544-1110
Facsimile (718) 374-6092

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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LAW OFFICE OF IDO TUCHMAN (YOR)
82-70 Beverly Road
Kew Gardens, NY 11415

EXAMINER	
PLOTKIN, JASON R	
ART UNIT	PAPER NUMBER
2492	

NOTIFICATION DATE	DELIVERY MODE
04/22/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pair@tuchmanlaw.com

Office Action Summary	Application No. 12/872,996	Applicant(s) ROSU, MARCEL C.	
	Examiner Jason Plotkin	Art Unit 2492	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 February 2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-4,6-12,14-18 and 20-25* is/are pending in the application.

5a) Of the above claim(s) *5,13 and 19* is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-4,6-12,14-18,20-25* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *8/32/2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some * c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Interim copies:

a)☐ All b)☐ Some c)☐ None of the: Interim copies of the priority documents have been received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/6/2013*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to the request for continuing examination filed on 2/26/2013. Claims 1- 4, 6- 12, 14- 18 and 20-25 are pending. Claims 1, 4, 10, 16 and 22 are amended. Claims 5, 13 and 19 are cancelled. Claims 1- 4, 6- 12, 14- 18 and 20-25 represent a mediator that prevents malware by restricting access to the memory.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 3/6/2013 was filed after the mailing date of the request for continuing examination on 2/26/2013. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. **Claims 1- 7, 10- 14, 16- 20 and 22- 25** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins (US Patent No. 8,151,032)**, hereinafter Oshins, and further in view of **VirtualBox Manual, 6/24/2010**.

For **claim 1**, Oshins teaches:

A system comprising:

(1) A computer processor; (Column 11, Line 45- 47.)

(2) An operating system kernel configured to execute on the computer processor; (Column 3, line 1- 3 A guest operating system running on a computer processor must include a kernel.),

(3) A mediator configure to execute on the computer processor (Column 3, line 11- 13 a hypervisor is a synonym for a mediator),

(4) [A mediator] to operate between the operating system kernel and a data processing application (Column 3, line 8- 11 defines a workload as an application executed on a guest OS or an entire guest OS; column 3, line 19-23 the hypervisor provides a level of indirection. By controlling what area of the memory the guest OS and the application are assigned to the hypervisor operates between the guest OS and the application),

(5) The mediator to control access of user-related application state of the data processing application (Column 3, line 12- 17; the user related application state is defined as the data produced by the data processing application during its operation and which is visible to the mediator and is not visible to the operating system kernel),

(6) [The mediator] to restrict access of the operating system kernel to the user-related application state (Column 3, line 8- 11 defines a workload as an application executed on a guest OS or an entire guest OS; column 3, line 19- 23 because the hypervisor assigns memory and controls reading and writing to memory it can restrict what the OS kernel has access to).

(7) The operating system has been modified to remove a portion of its functionality to the mediator (Column 4, line 46- 53),

(8) the mediator has higher access rights than the operating system kernel to the computer processor and the data processing resources (Column 4, line 14-

18 the mediator/hypervisor intercepts all calls between the guest OS and the processor and memory effectively giving it higher access rights).

Oshins fails to teach a non-virtualized operating system configured to execute on a computer processor.

VirtualBox teaches a non-virtualized host operating system and a software virtualization environment where a guest OS runs on a virtual machine implemented on the host OS. (VirtualBox Manual Ch. 10 §Details about Software Virtualization Paragraph 8. The hypervisor of Oshins can be implemented to operate between the host OS and the Guest OS of Virtualbox)

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins with the teaching of a hosted virtual machine of VirtualBox in order to create a more secure environment by restricting the memory access between the guest OS and the Host OS.

For **claim 2**, Oshins teaches:

A system wherein:

(1) The user related application state comprises data produced by the data processing application during its operation (Column 12, line 8- 18 describes an application that stores the data it produces in memory),

(2) [The data] is visible to the mediator and not visible to the operating system kernel (Column 7, line 48-60, Fig. 2 The hypervisor can gain access to the data freely because it controls the DMA filter. The DMA filter intercepts every request from the guest OS to access the memory, therefore the hypervisor limits what memory the guest OS has access to. Thus data stored in memory can be visible to the hypervisor but not the guest OS).

For **claim 3**, Oshins teaches:

A system wherein the operating system kernel controls system- related application state that is used to control portions of the data processing application at the operating system kernel's level (Column 7, line 39- 47).

For **claim 4**, Oshins teaches:

A system wherein the data processing resources in communication with the computer processor (Column 3, line 11- 13 the hypervisor controls the data processing resources/ physical memory and the hypervisor is in communication with the processor therefore the data processing resources are in communication with the processor).

For **claim 6**, Oshins teaches:

A system wherein the operating system kernel has restricted access to user- related application state because the mediator preforms transfers between the user- related application state and data structures of the operating system kernel as needed to enable the operating system kernel's remaining functions (Column 7, lines 9- 18;).

For **claim 7**, Oshins teaches:

A system wherein the mediator is configured to control system calls and exceptions between the operating system kernel and the data processing application (Column 4, line 46- 53 the mediator/ hypervisor controls all system calls; Column 8, line 66- column 9, line 12 mediator/ hypervisor handles errors when assigning memory).

Claim 10, 11, 12 and 14 fail to teach or define any new material over the apparatus claim 1, 2, 3, 5 and 7 respectively.

Claim 16, 17, 18 and 20 fail to teach or define any new material over the apparatus claim 1, 2, 3, 5 and 7 respectively.

For **claim 22** Oshins teaches:

i. A system comprising an operating system kernel configured to execute on a computer processor, a data processing application and a mediator configured to execute on the computer processor and operating between the operating system kernel and the data processing application, the mediator configured to control access of user related application state of the data processing application and restricting access of the operating system kernel to the user related application state (rejected as being analogous to claim 1).

ii. The user- related application state data comprises data produced by the data processing application during its operation and which is visible to the mediator and not visible to the operating system kernel (rejected as being analogous to claim 2).

iii. The mediator having higher access rights than the operating system kernel to the computer processor (rejected as being analogous to claim 5).

Claim 23, 24 and 25 fail to teach or define any new material over the apparatus claims 3, 6 and 7.

6. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins** further in view of **VirtualBox** as applied to claim 7 above, and further in view of **Arndt et al. (US Publication No. 2006/0179177)**, hereinafter Arndt.

Oshins discloses a computer processor in communication with the following data processing resources:

i. Computer memory including:

(1) A mediator configured to (Column 3, line 3- 6):

(a) Use a memory management unit (MMU) to control access rights to memory (Column 5, line 58- 61, the memory management component in the guest OS has the same functionality as a MMU),

(2) Operating system kernel (Column 3, line 1-3),

(3) A shared user- level library (Column 6, line 46-49, a shared library is a file intended to be shared by executable files and loaded into memory at run time as opposed to copied by a linker when it creates a single executable file),

ii. Communication network (Column 4, line 16),

iii. Input/output (I/O) devices (Column 4, line 16),

iv. Data processing devices (Column 4, line 12- 21).

Oshins does not disclose computer memory including:

i. System daemon,

ii. A mediator configured to:

(1) Virtualize select registers of i/o devices,

(2) Use an I/O memory management unit (I/OMMU) to control data transfers between I/O devices.

Arndt discloses computer memory including:

i. System daemon (Paragraph 6, line 1- 4, a service that operates in the background not under the direct control of the user is a daemon),

ii. A mediator configured to (Paragraph 52, line 2- 5):

(1) Virtualize select registers of I/O devices (Paragraph 37, line 1- 6),

(2) Use an I/OMMU to control data transfers between I/O devices (Paragraph 32, line 4- 9; Wikipedia, IOMMU introduction page 1, a TCE table is a synonym for an I/OMMU).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins and the teaching of a hosted virtual machine of VirtualBox with the teachings of Arndt of a system daemon and a mediator configured to virtualize select registers of I/O devices and use an I/OMMU to control data transfers between I/O devices in order to reduce data transfer times between I/O devices and a guest OS running on a hypervisor.

7. **Claims 9, 15 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins** further in view of **VirtualBox** as applied to claim 1 above, and further in view of **Bakke et al. (US Publication No. 2007/0011272)**, hereinafter Bakke.

For **claim 9**, Neither Oshins nor VirtualBox disclose:

a. An internet protocol security module (IPSM),

i. The IPSM exists outside the OS kernel,

ii. The IPSM is a system daemon,

iii. The IPSM directly communicates with the data processing application,

(1) Without the OS kernel.

Bakke discloses:

a. An IPSM (Paragraph 83, line 6- 10),

i. The IPSM exists outside the OS kernel (Paragraph 62, line 2- 4),

ii. The IPSM is a system daemon (Paragraph 62, line 1-10, a service that operates in the background not under the direct control of the user is a daemon),

iii. The IPSM directly communicates with the data processing application (Paragraph 62, line 10- 13),

(1) Without the OS kernel (Paragraph 62, line 10- 13).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins and the teaching of a hosted virtual machine of VirtualBox with the teachings of Bakke in order to reduce the time it takes for an application in a guest OS to transmit or receive data from the internet while increasing the security of the connection.

Claim 15 and 21 fail to teach or define anything new over the apparatus claim 9.

Response to Arguments

8. Applicant's arguments filed 2/26/2013 have been fully considered but they are not persuasive.

9. In response to applicant's argument that Oshins in combination with VirtualBox fail to suggest modifying an operating system kernel to remove a portion of its functionality to the mediator, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The reference De Los Reyes et al. (US Publication No 2011/0145833) discloses executing multiple virtual machines on a mobile device. The reference Agesen et al. (US Patent No 7,506,122) discloses a method of a virtual machine using memory segmentation to protect its memory when executing instructions from the guest OS.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Plotkin whose telephone number is (571)270-7892. The examiner can normally be reached on M-F 8 A.M. -5 P.M. (alternate Fridays).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. P./
Examiner, Art Unit 2492

/saleh najjar/
Supervisory Patent Examiner, Art Unit 2492

REMARKS

The Applicants thank the Examiner for the careful review of the present application. In the Office Action dated April 22, 2013, claims 1-4, 6-12, 14-18 and 20-25 were rejected under 35 U.S.C. § 103.

Claims 1-4, 6-12, 14-18 and 20-25 remain in this application, with claims 1, 10, 16 and 22 being independent claims.

I. CLAIMS 1-4, 6-12, 14-18 AND 20-25 ARE PATENTABLE

The Office Action rejects claims 1-7, 10-14, 16-20, and 22-25 are rejected under 35 U.S.C. § 103 as allegedly obvious over U.S. Patent No. 8,151,032 ("Oshins") in view of VirtualBox, VirtualBox Manual, http://www.virtualbox.org/manual/ch10.html (last visited Nov. 15, 2012) ("VirtualBox"). OA, pp. 2-8.

According to the Supreme Court, the factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966), "continue to define the inquiry that controls" obviousness rejections under 35 U.S.C. 103. KSR Int'l v. Teleflex Inc., 550 U.S. 398, 407 (2007). Under the analysis required by Graham to support a rejection under 35 U.S.C. 103, "the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." Graham, 383 U.S. at 17-18. While these inquiries are factual, the ultimate determination of

obviousness is a conclusion of law made in view of the totality of the resolved Graham factors. KSR, 550 U.S. at 427; Graham, 383 U.S. at 17.

The Applicants respectfully submit that claim 1 is not obvious over Oshins in view of Virtual Box. Oshins relates to techniques to increase runtime performance of a guest operating system (virtualized operating system) executing on a hypervisor by allowing the guest operating system direct access to physical hardware devices to perform Direct Memory Access (DMA) transfers, while allowing the system memory allocated to the guest operating system to be overcommitted. Oshins, col. 1, lines 44-49. Virtual Box teaches a non-virtualized host operating system and a software virtualization environment where a guest OS runs on a virtual machine implemented on the host OS.

By contrast, claim 1 recites in part, "wherein the operating system kernel is modified to remove a portion of its functionality to the mediator." The Office alleges Oshins discloses the mediator has higher access rights than the operating system kernel to the computer processor and the data processing resources at column 4, lines 14-18 of Oshins. OA, p. 3. The Applicants respectfully disagree.

Column 4, lines 46-53 of Oshins states, "This is called guest physical memory, as described above. In reality, the memory assigned to the guest OS is almost never contiguous and the addresses that the guest OS use for addressing its memory are almost never the real physical addresses for that memory. The hypervisor creates and maintains indirection tables (usually called page tables) that enable a processor or the hypervisor to fix up these addresses on the fly." The passage describes that a

hypervisor creates and maintains indirection tables that enable a processor or the hypervisor to remap memory addresses assigned to the guest OS on the fly. However, this is not what is claimed.

Claim 1 requires modifying the operating system kernel to remove a portion of its functionality to the mediator. No modification of the operating system kernel is disclosed by Oshins. For example, the cited passage discloses remapping memory addresses assigned to the guest OS on the fly. This is not a modification of the guest OS but rather an added layer of address manipulation. The guest OS is left unchanged.

Moreover, the Office fails to provide any evidence that one of ordinary skill in the art at the time of the invention would consider the teachings of Oshins analogous to modifying the operating system kernel to remove a portion of its functionality to the mediator. As discussed above, the citation offered by the Office fails to modification of the guest OS. Additionally, as discussed above, Virtual Box fails to cure the deficiencies of Oshins.

The differences between the cited prior art and claim 1 are significant because the claimed subject matter provides features and advantages not known or available in the cited prior art. Therefore, no combination of the cited prior art references would feasibly produce the subject matter recited in claim 1. This fact is significant because under the rational chosen by the Office to reject claim 1, a *prima facie* case of obviousness requires a factual demonstration that "the prior art included each element claimed, although not necessarily in a single prior art reference, with the only difference between the claimed

invention and the prior art being the lack of actual combination of the elements in a single prior art reference." MPEP 2143.

Thus, for at least the foregoing reason, claim 1 is not obvious over Oshins in view of Virtual Box. Independent claims 10, 16 and 22 recite elements similar to claim 1. Thus, claims 1 10, 16 and 22 are allowable over Oshins in view of Virtual Box. Their dependent claims, which recite yet further distinguishing features, and are also patentable over Oshins in view of Virtual Box and require no further discussion herein.

CONCLUSION

In view of the forgoing remarks, it is respectfully submitted that this case is now in condition for allowance and such action is respectfully requested. If any points remain at issue that the Examiner feels could best be resolved by a telephone interview, the Examiner is urged to contact the attorney below.

No fee is believed due with this Amendment, however, should a fee be required please charge Deposit Account 50-0510. Should any extensions of time be required, please consider this a petition thereof and charge Deposit Account 50-0510 the required fee.

Respectfully submitted,

Dated: July 21, 2013

/ido tuchman/

Ido Tuchman, Reg. No. 45,924
Law Office of Ido Tuchman
82-70 Beverly Road
Kew Gardens, NY 11415
Telephone (718) 544-1110
Facsimile (718) 374-6092

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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LAW OFFICE OF IDO TUCHMAN (YOR)
82-70 Beverly Road
Kew Gardens, NY 11415

EXAMINER	
PLOTKIN, JASON R	
ART UNIT	PAPER NUMBER
2492	

NOTIFICATION DATE	DELIVERY MODE
08/30/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pair@tuchmanlaw.com

Office Action Summary

Application No.	Applicant(s)		
12/872,996	ROSU, MARCEL C.		
Examiner	**Art Unit**	**AIA (First Inventor to File) Status**	
Jason Plotkin	2492	No	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *7/21/2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-4,6-12,14-18 and 20-25* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-4,6-12,14-18 and 20-25* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *8/31/2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some * c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to the amendment filed on 7/21/2013. Claims 1- 4, 6- 12, 14- 18 and 20-25 are pending. Claims 5, 13 and 19 are cancelled. Claims 1- 4, 6- 12, 14- 18 and 20-25 represent a mediator that prevents malware by restricting access to the memory.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. **Claims 1- 7, 10- 14, 16- 20 and 22- 25** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins (US Patent No. 8,151,032)**, hereinafter Oshins, and further in view of **VirtualBox Manual, 6/24/2010**.

For **claim 1**, Oshins teaches:

A system comprising:

(1) A computer processor; (Column 11, Line 45- 47.)

(2) An operating system kernel configured to execute on the computer processor; (Column 3, line 1- 3 A guest operating system running on a computer processor must include a kernel.),

(3) A mediator configure to execute on the computer processor (Column 3, line 11- 13 a hypervisor is a synonym for a mediator),

(4) [A mediator] to operate between the operating system kernel and a data processing application (Column 3, line 8- 11 defines a workload as an application executed on a guest OS or an entire guest OS; column 3, line 19-23 the hypervisor provides a level of indirection. By controlling what area of the memory the guest OS and the application are assigned to the hypervisor operates between the guest OS and the application),

(5) The mediator to control access of user-related application state of the data processing application (Column 3, line 12- 17; the user related application state is defined as the data produced by the data processing application during its operation and which is visible to the mediator and is not visible to the operating system kernel),

(6) [The mediator] to restrict access of the operating system kernel to the user-related application state (Column 3, line 8- 11 defines a workload as an application executed on a guest OS or an entire guest OS; column 3, line 19- 23 because the hypervisor assigns memory and controls reading and writing to memory it can restrict what the OS kernel has access to).

(7) The operating system has been modified to remove a portion of its functionality to the mediator (Column 4, line 46- 53),

(8) the mediator has higher access rights than the operating system kernel to the computer processor and the data processing resources (Column 4, line 14- 18 the mediator/hypervisor intercepts all calls between the guest OS and the processor and memory effectively giving it higher access rights).

Oshins fails to teach a non-virtualized operating system configured to execute on a computer processor.

VirtualBox teaches a non-virtualized host operating system and a software virtualization environment where a guest OS runs on a virtual machine implemented on the host OS. (VirtualBox Manual Ch. 10 §Details about Software Virtualization Paragraph 8. The hypervisor of Oshins can be implemented to operate between the host OS and the Guest OS of Virtualbox)

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins with the teaching of a hosted virtual machine of VirtualBox in order to create a more secure environment by restricting the memory access between the guest OS and the Host OS.

For **claim 2**, Oshins teaches:

A system wherein:

(1) The user related application state comprises data produced by the data processing application during its operation (Column 12, line 8- 18 describes an application that stores the data it produces in memory),

(2) [The data] is visible to the mediator and not visible to the operating system kernel (Column 7, line 48-60, Fig. 2 The hypervisor can gain access to the data freely because it controls the DMA filter. The DMA filter intercepts every request from the guest OS to access the memory, therefore the hypervisor limits what memory the guest OS has access to. Thus data stored in memory can be visible to the hypervisor but not the guest OS).

For **claim 3**, Oshins teaches:

A system wherein the operating system kernel controls system- related application state that is used to control portions of the data processing application at the operating system kernel's level (Column 7, line 39- 47).

For **claim 4**, Oshins teaches:

A system wherein the data processing resources in communication with the computer processor (Column 3, line 11- 13 the hypervisor controls the data processing resources/ physical memory and the

hypervisor is in communication with the processor therefore the data processing resources are in communication with the processor).

For **claim 6**, Oshins teaches:

A system wherein the operating system kernel has restricted access to user- related application state because the mediator preforms transfers between the user- related application state and data structures of the operating system kernel as needed to enable the operating system kernel's remaining functions (Column 7, lines 9- 18;).

For **claim 7**, Oshins teaches:

A system wherein the mediator is configured to control system calls and exceptions between the operating system kernel and the data processing application (Column 4, line 46- 53 the mediator/ hypervisor controls all system calls; Column 8, line 66- column 9, line 12 mediator/ hypervisor handles errors when assigning memory).

Claim 10, 11, 12 and 14 fail to teach or define any new material over the apparatus claim 1, 2, 3, 5 and 7 respectively.

Claim 16, 17, 18 and 20 fail to teach or define any new material over the apparatus claim 1, 2, 3, 5 and 7 respectively.

For **claim 22** Oshins teaches:

i. A system comprising an operating system kernel configured to execute on a computer processor, a data processing application and a mediator configured to execute on the computer processor and operating between the operating system kernel and the data processing application, the mediator configured to control access of user related application state of the data processing application and restricting access of the operating system kernel to the user related application state (rejected as being analogous to claim 1).

ii. The user- related application state data comprises data produced by the data processing application during its operation and which is visible to the mediator and not visible to the operating system kernel (rejected as being analogous to claim 2).

iii. The mediator having higher access rights than the operating system kernel to the computer processor (rejected as being analogous to claim 5).

Claim 23, 24 and 25 fail to teach or define any new material over the apparatus claims 3, 6 and 7.

5. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins** further in view of **VirtualBox** as applied to claim 7 above, and further in view of **Arndt et al. (US Publication No. 2006/0179177)**, hereinafter Arndt.

Oshins discloses a computer processor in communication with the following data processing resources:

i. Computer memory including:

(1) A mediator configured to (Column 3, line 3- 6):

(a) Use a memory management unit (MMU) to control access rights to memory (Column 5, line 58- 61, the memory management component in the guest OS has the same functionality as a MMU),

(2) Operating system kernel (Column 3, line 1-3),

(3) A shared user- level library (Column 6, line 46-49, a shared library is a file intended to be shared by executable files and loaded into memory at run time as opposed to copied by a linker when it creates a single executable file),

ii. Communication network (Column 4, line 16),

iii. Input/output (I/O) devices (Column 4, line 16),

iv. Data processing devices (Column 4, line 12- 21).

Oshins does not disclose computer memory including:

i. System daemon,

ii. A mediator configured to:

(1) Virtualize select registers of i/o devices,

(2) Use an I/O memory management unit (I/OMMU) to control data transfers between I/O devices.

Arndt discloses computer memory including:

i. System daemon (Paragraph 6, line 1- 4, a service that operates in the background not under the direct control of the user is a daemon),

ii. A mediator configured to (Paragraph 52, line 2- 5):

(1) Virtualize select registers of I/O devices (Paragraph 37, line 1- 6),

(2) Use an I/OMMU to control data transfers between I/O devices (Paragraph 32, line 4- 9; Wikipedia, IOMMU introduction page 1, a TCE table is a synonym for an I/OMMU).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins and the teaching of a hosted virtual machine of VirtualBox with the teachings of Arndt of a system daemon and a mediator configured to virtualize select registers of I/O devices and use an I/OMMU to control data transfers between I/O devices in order to reduce data transfer times between I/O devices and a guest OS running on a hypervisor.

6. **Claims 9, 15 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oshins** further in view of **VirtualBox** as applied to claim 1 above, and further in view of **Bakke et al. (US Publication No. 2007/0011272)**, hereinafter Bakke.

For **claim 9**, Neither Oshins nor VirtualBox disclose:

a. An internet protocol security module (IPSM),

i. The IPSM exists outside the OS kernel,

ii. The IPSM is a system daemon,

iii. The IPSM directly communicates with the data processing application,

(1) Without the OS kernel.

Bakke discloses:

a. An IPSM (Paragraph 83, line 6- 10),

i. The IPSM exists outside the OS kernel (Paragraph 62, line 2- 4),

ii. The IPSM is a system daemon (Paragraph 62, line 1-10, a service that operates in the background not under the direct control of the user is a daemon),

iii. The IPSM directly communicates with the data processing application (Paragraph 62, line 10- 13),

(1) Without the OS kernel (Paragraph 62, line 10- 13).

At the time of the invention, it would have been obvious to one having ordinary skill in the art to modify the teaching of using DMA in a paravirtualized operating system of Oshins and the teaching of a hosted virtual machine of VirtualBox with the teachings of Bakke in order to reduce the time it takes for an application in a guest OS to transmit or receive data from the internet while increasing the security of the connection.

Claim 15 and 21 fail to teach or define anything new over the apparatus claim 9.

Response to Arguments

7. Applicant's arguments filed 7/21/2013 have been fully considered but they are not persuasive. Applicant argues that the reference Oshins fails to disclose modifying a guest OS kernel. Applicant's remarks 7/21/13 pg. 12. The examiner respectfully disagrees with the applicant's interpretation of the claim and the reference. The applicant's position appears to be that modifying an OS kernel requires a change to the OS's underlying source code or the like. This position is to narrow. Any party that intercepts and replaces a function of an OS kernel has modified said OS kernel because the form or qualities of said function and OS kernel has objectively changed. Thus when the mediator of Oshins intercepts the memory calls of the Guest OS and replaces them the guest OS has been modified. Oshins Column 4, line 46- 53. The combination of Oshins and Virtual Box teach all the elements of the independent claims 1, 10, 16 and 22.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date

of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Plotkin whose telephone number is (571)270-7892. The examiner can normally be reached on M-F 8 A.M. -5 P.M. (alternate Fridays).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. P./
Examiner, Art Unit 2492

/saleh najjar/
Supervisory Patent Examiner, Art Unit 2492

REMARKS

The Applicants thank the Examiner for the careful review of the present application. In the Final Office Action dated August 30, 2013 ("FOA"), claims 1-4, 6-12, 14-18 and 20-25 were rejected under 35 U.S.C. § 103.

Claims 1-4, 6-12, 14-18 and 20-25 remain in this application, with claims 1, 10, 16 and 22 being independent claims. In support of claim allowance, the Applicants submit the following:

I. CLAIMS 1-4, 6-12, 14-18 AND 20-25 ARE PATENTABLE

The Office Action rejects claims 1-7, 10-14, 16-20, and 22-25 are rejected under 35 U.S.C. § 103 as allegedly obvious over U.S. Patent No. 8,151,032 ("Oshins") in view of VirtualBox, VirtualBox Manual, http://www.virtualbox.org/manual/ch10.html (last visited Nov. 15, 2012) ("VirtualBox"). FOA, p. 2.

According to the Supreme Court, the factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966), "continue to define the inquiry that controls" obviousness rejections under 35 U.S.C. 103. KSR Int'l v. Teleflex Inc., 550 U.S. 398, 407 (2007). Under the analysis required by Graham to support a rejection under 35 U.S.C. 103, "the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." Graham, 383 U.S. at 17-18. While

these inquiries are factual, the ultimate determination of obviousness is a conclusion of law made in view of the totality of the resolved Graham factors. KSR, 550 U.S. at 427; Graham, 383 U.S. at 17.

Claim 1 recites in part, "wherein the operating system kernel is modified to remove a portion of its functionality to the mediator." The Office alleges "a hypervisor is a synonym for a mediator" and that Oshins discloses "wherein the operating system kernel is modified to remove a portion of its functionality to the mediator" at column 4, lines 46-53. FOA, p. 3. The Applicants respectfully disagree.

Column 4, lines 46-53 of Oshins states, "This is called guest physical memory, as described above. In reality, the memory assigned to the guest OS is almost never contiguous and the addresses that the guest OS use for addressing its memory are almost never the real physical addresses for that memory. The hypervisor creates and maintains indirection tables (usually called page tables) that enable a processor or the hypervisor to fix up these addresses on the fly." The cited passage discloses remapping memory addresses assigned to the guest OS on the fly. In other words, the hypervisor creates and maintains indirection tables that enable a processor or the hypervisor to remap memory addresses assigned to the guest OS on the fly. However, this is not a modification of the guest OS but rather an added layer of address manipulation. The guest OS is left unchanged.

The Examiner responds, "Any party that intercepts and replaces a function of an OS kernel has modified said OS kernel because the form or qualities of said function and OS kernel has

objectively changed." FOA, p. 8.

First, Oshins does not disclose replacing a function of the guest OS kernel. As discussed above, Oshins discloses adding a layer of address manipulation to memory addresses assigned to the guest OS. The memory addresses assignment by underlying operating system is not modified and there is no discussion of modifying the guest OS in Oshins. As the Examiner recognizes, "the mediator of Oshins intercepts the memory calls of the Guest OS and replaces them." FOA, p. 8. Thus, the Examiner's interpretation that Oshins "replaces" a function of the guest OS kernel is unsupported by its teachings.

Second, the Examiner's claim interpretation is unreasonable. The Examiner alleges, "Thus when the mediator of Oshins intercepts the memory calls of the Guest OS and replaces them the guest OS has been modified. Oshins Column 4, line 46-53." FOA, p. 8.

To "modify" means "a: to make minor changes in b: to make basic or fundamental changes in often to give a new orientation to or to serve a new end." Webster's Ninth New Collegiate Dictionary, Merrian-Webster, Inc., p. 763 (1983). Modify is also defined as "to change somewhat the form or qualities of; alter partially; amend . . . ." http://dictionary.reference.com/browse/modify (2013).

Claim 1 requires modification of the operating system kernel. "Intercepting" a memory call by the guest OS does not modify or change the guest OS functionality for the same reason forwarding an email does not modify the original email address. The Examiner's position that one of ordinary skill in the art would consider a downstream modification of memory addresses

assigned to the guest OS is necessarily a modification of the guest OS is without support. Claim 1 requires modification of the operating system kernel itself, not the memory calls.

The differences between the cited prior art and claim 1 are significant because the claimed subject matter provides features and advantages not known or available in the cited prior art. Therefore, no combination of the cited prior art references would feasibly produce the subject matter recited in claim 1. This fact is significant because under the rational chosen by the Office to reject claim 1, a *prima facie* case of obviousness requires a factual demonstration that "the prior art included each element claimed, although not necessarily in a single prior art reference, with the only difference between the claimed invention and the prior art being the lack of actual combination of the elements in a single prior art reference." MPEP 2143.

Thus, for at least the foregoing reason, claim 1 is not obvious over Oshins in view of Virtual Box. Independent claims 10, 16 and 22 recite elements similar to claim 1. Thus, claims 1 10, 16 and 22 are allowable over Oshins in view of Virtual Box. Their dependent claims, which recite yet further distinguishing features, and are also patentable over Oshins in view of Virtual Box and require no further discussion herein.

CONCLUSION

In view of the forgoing remarks, it is respectfully submitted that this case is now in condition for allowance and such action is respectfully requested. If any points remain at issue that the Examiner feels could best be resolved by a

telephone interview, the Examiner is urged to contact the attorney below.

No fee is believed due with this Amendment, however, should a fee be required please charge Deposit Account 50-0510. Should any extensions of time be required, please consider this a petition thereof and charge Deposit Account 50-0510 the required fee.

Respectfully submitted,

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/ido tuchman/

Ido Tuchman, Reg. No. 45,924
Law Office of Ido Tuchman
82-70 Beverly Road
Kew Gardens, NY 11415
Telephone (718) 544-1110
Facsimile (718) 374-6092